

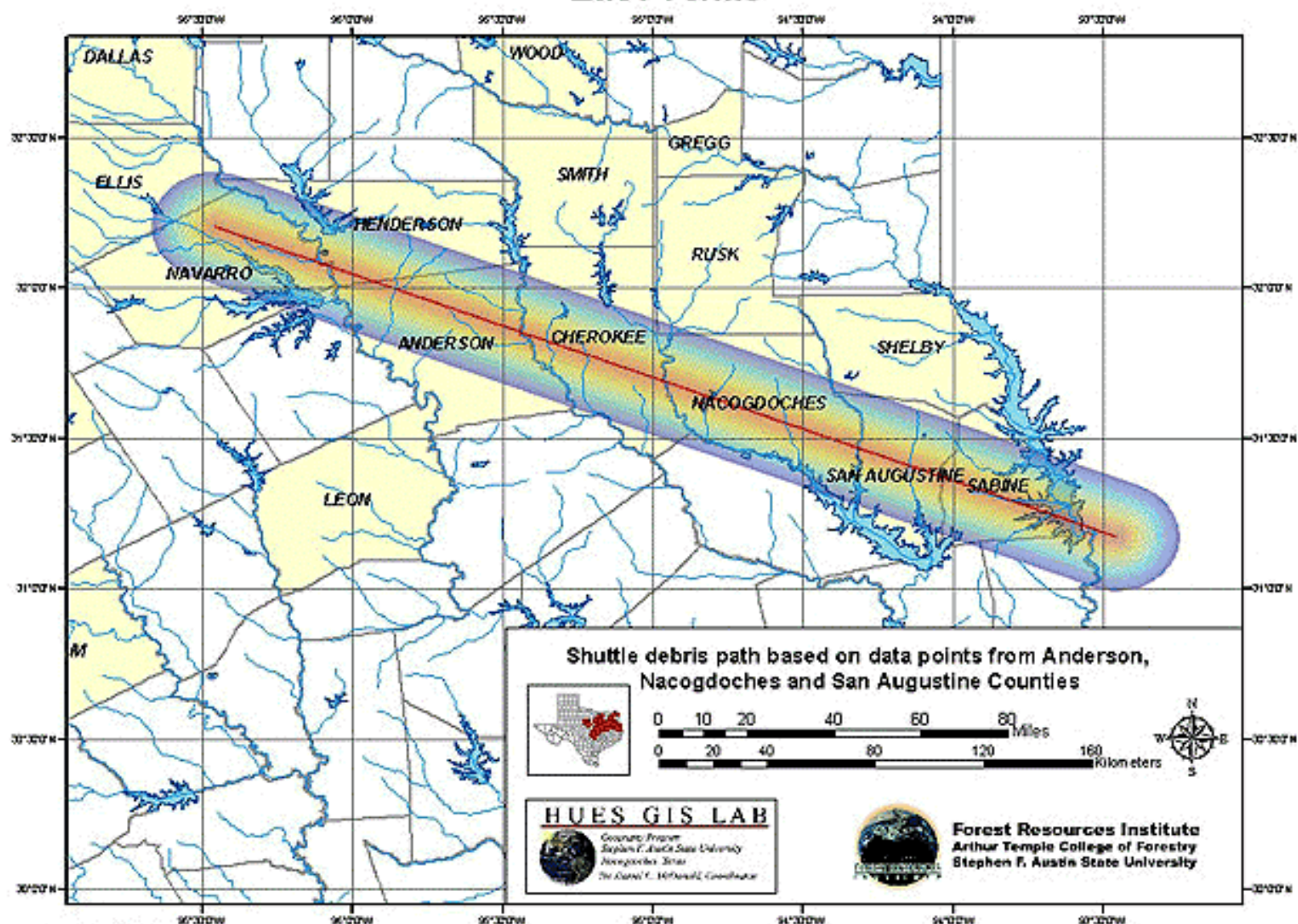
EPA Dive Operations Supporting
Shuttle Columbia Debris Recovery



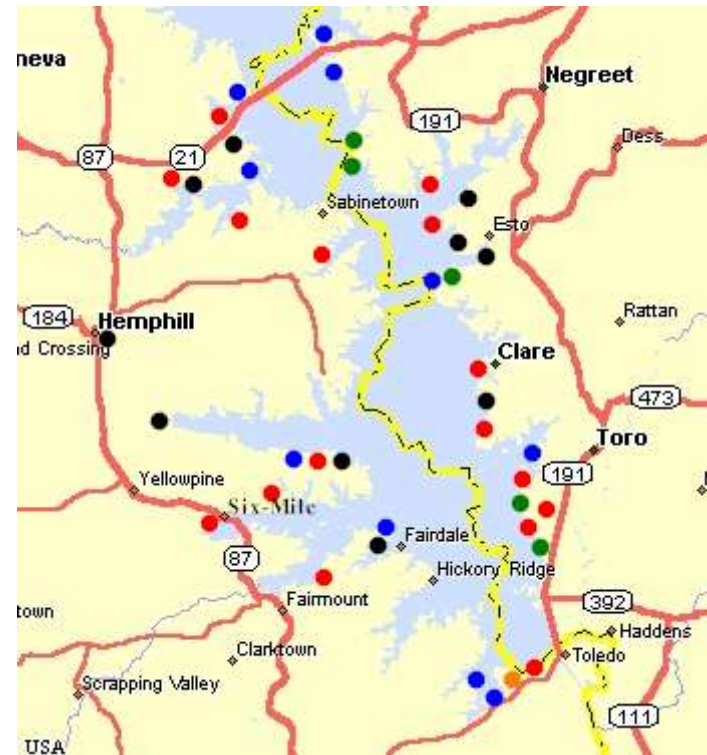
**STS-107, Shuttle flight No. 111,
Columbia flight No. 28
Columbia and her crew were lost during
entry 16 minutes before landing
Feb. 1, 2003**

**Mission Commander: Rick Husband
Pilot: William "Willie" McCool
Payload Commander: Michael Anderson
Mission Specialist 1: Kalpana Chawla
Mission Specialist 2: David Brown
Mission Specialist 3: Laurel Clark
Payload Specialist 1: Ilan Ramon (Israel)**

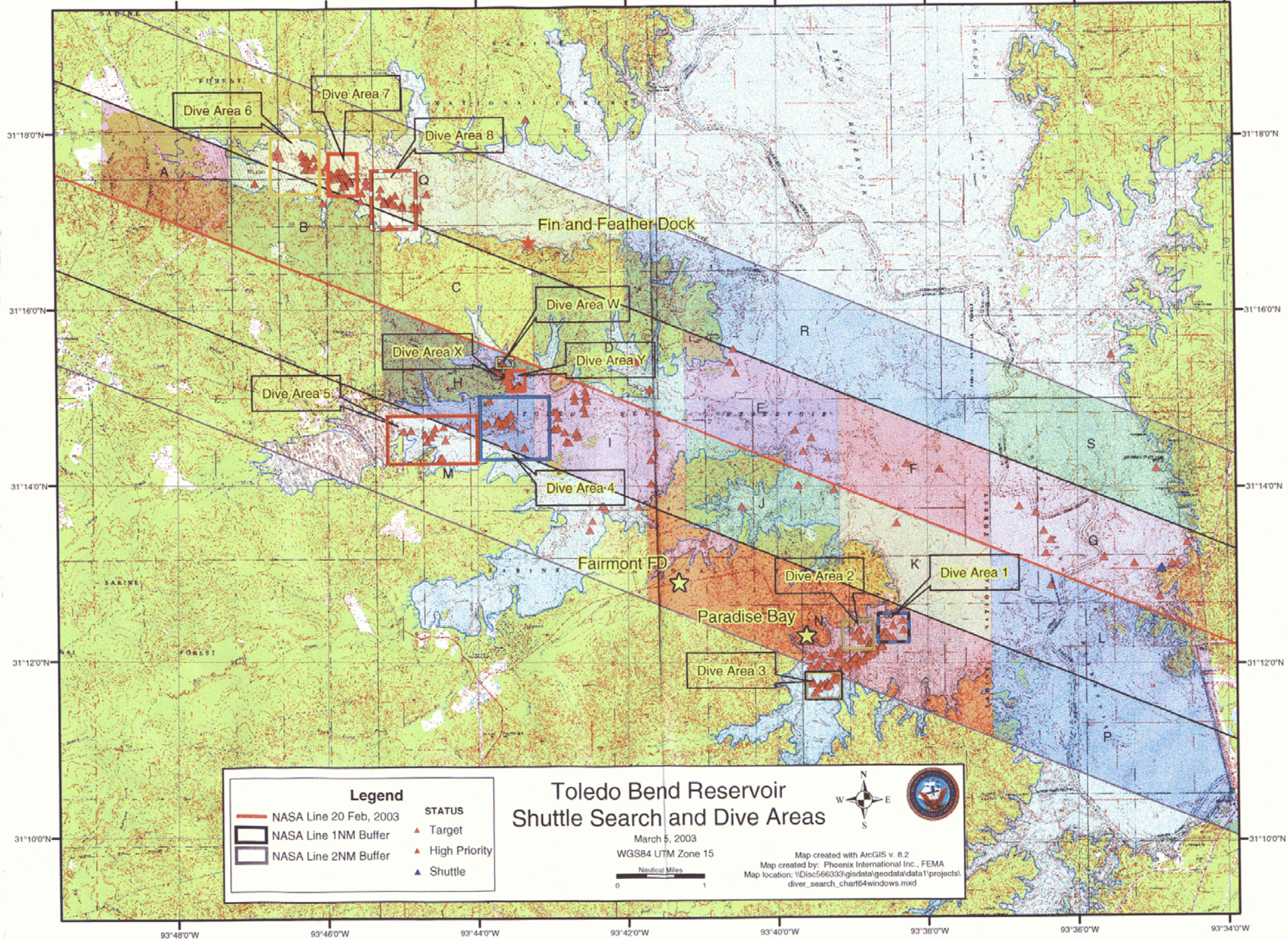
East Texas



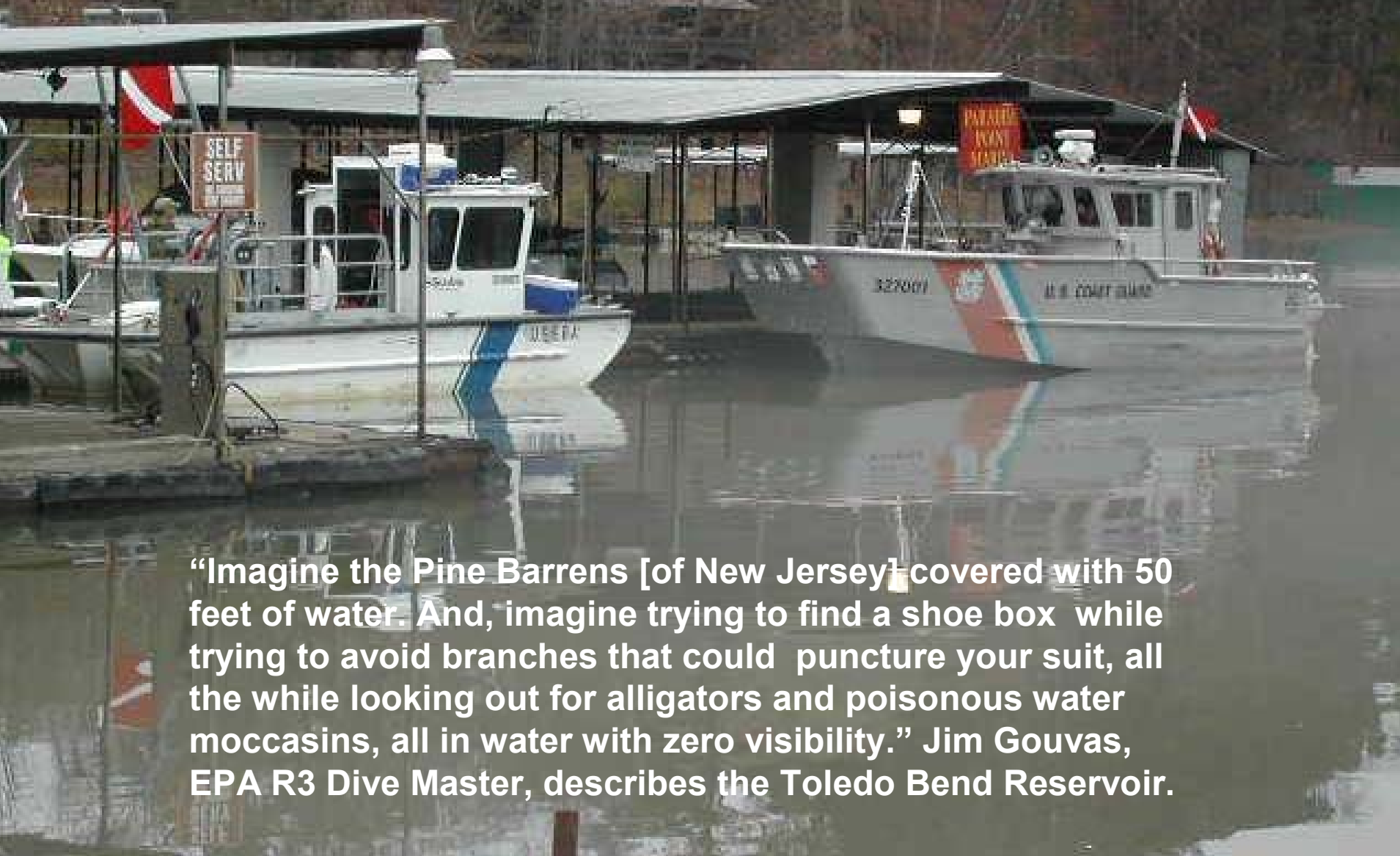
February 3, 2003 3:30 am



The Toledo Bend Reservoir was formed by the damming of the Sabine River. It is located eighty miles northeast of Beaumont Texas on the border between Texas and Louisiana. Construction of the dam that formed the reservoir began on May 11, 1964, and deliberate impoundment of water began on October 3, 1966. The reservoir filled quickly preventing logging of the pine, cypress and oak trees forest.



Paradise Cove Marina with Coast Guard and EPA Region 7 Dive Boat



“Imagine the Pine Barrens [of New Jersey] covered with 50 feet of water. And, imagine trying to find a shoe box while trying to avoid branches that could puncture your suit, all the while looking out for alligators and poisonous water moccasins, all in water with zero visibility.” Jim Gouvas, EPA R3 Dive Master, describes the Toledo Bend Reservoir.

Coast Guard boat prepares to leave Paradise Cove with EPA ERT personnel, surface air supply system and sonar equipment on deck.



L to R Bill Hoffman and John Armstead, EPA R3 Divers, prepare their gear on one of the two Region 7 boats that were mobilized for the search.



**L to R Bill Muir, R3 UDO, Jeff Weatherford, R7 OSC, and Bill Hoffman
R3 Dive Master confirm buoys and targets before diving.**



NASA put the Navy in charge of the search, but EPA was called in because some debris could have been contaminated with hydrazine and nitrogen pentoxide used in the retro rockets,. EPA divers from across the country mobilized to Texas to search the 50 degree water.



Navy Decompression Chamber

Hazardous boating conditions on the Reservoir included: partially submerged logs and trees just outside the marked navigation channels. Thick fog sometimes limited topside visibility and required the use of GPS for navigation.





Combined Local, County, State and Federal Search Effort – Navy, EPA and local Dive Teams from Houston and Galveston took part in the search. Support boats and security were provided by USCG, Texas Park and Rec. and Jasper County Sheriffs Dept. and Fairmount Fire Department

**Targets were established using “side scan sonar.”
Buoys were used to mark the sites of interest.**



EPA Region 7 Skimmer Boat Anchored on Target Location

Eric Nold, R7 OSC, on Region 7 Boats rafted up on target location



Primary and Standby Diver Hard Wire Communication and Safety Line

L to R Joe Davis, R7 OSC, Sean Sheldrake R10 DDO, Steve Donohue, R3 Diver



**Bill Muir, R3 UDO, on
tethered SCUBA**



The divers were in dry suits with full face masks and either on SCUBA or surface supplied air. Divers were in constant physical contact (tether) and communication with their “tender” on the boat. Bill Muir, R3 UDO.



The line was clipped to the target anchor and either vector or sweep search was used to search the target area.



Joe Davis, R7 OSC, enters water with search line.

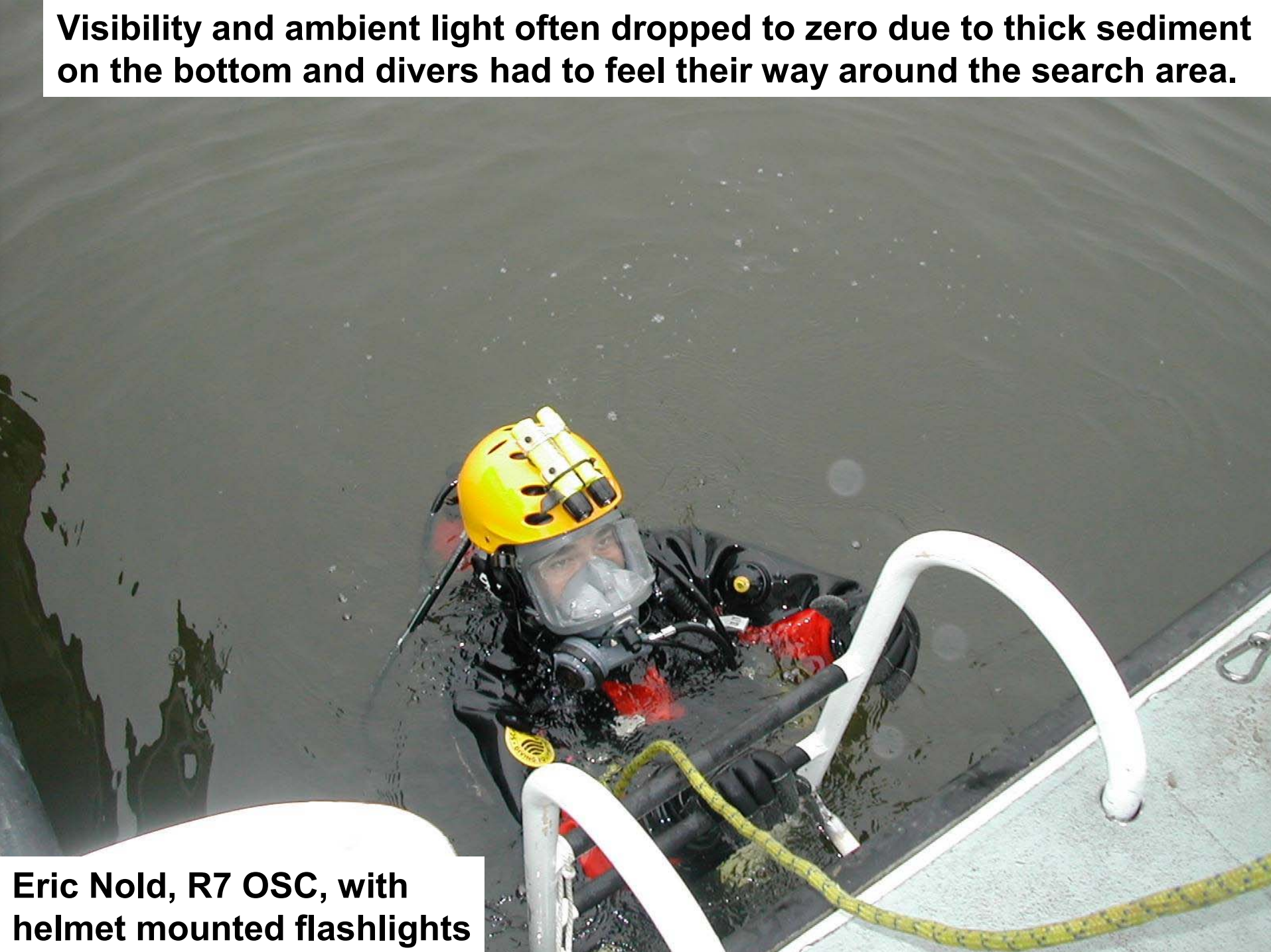
**Shuttles are made of aluminum.
Magnetometer survey of lake
was not successful.**

**A new sonar was used in the
Search that was capable of seeing
both the diver and the area.
However, trees and stumps often
cast a “shadow” that obscured
both.**



Visibility and ambient light often dropped to zero due to thick sediment on the bottom and divers had to feel their way around the search area.

**Eric Nold, R7 OSC, with
helmet mounted flashlights**



**Sean Sheldrake, R10 DDO
returns to the boat.**

**Steve Donohue, R3 Diver,
tending here, was impressed by
how the divers from the
different EPA Regions were able
to quickly mesh together as a
team to perform search
operations.**



Rob Peterson, R10 RDO, donning surface supply gear with the help of Dan Cooke, ERT.



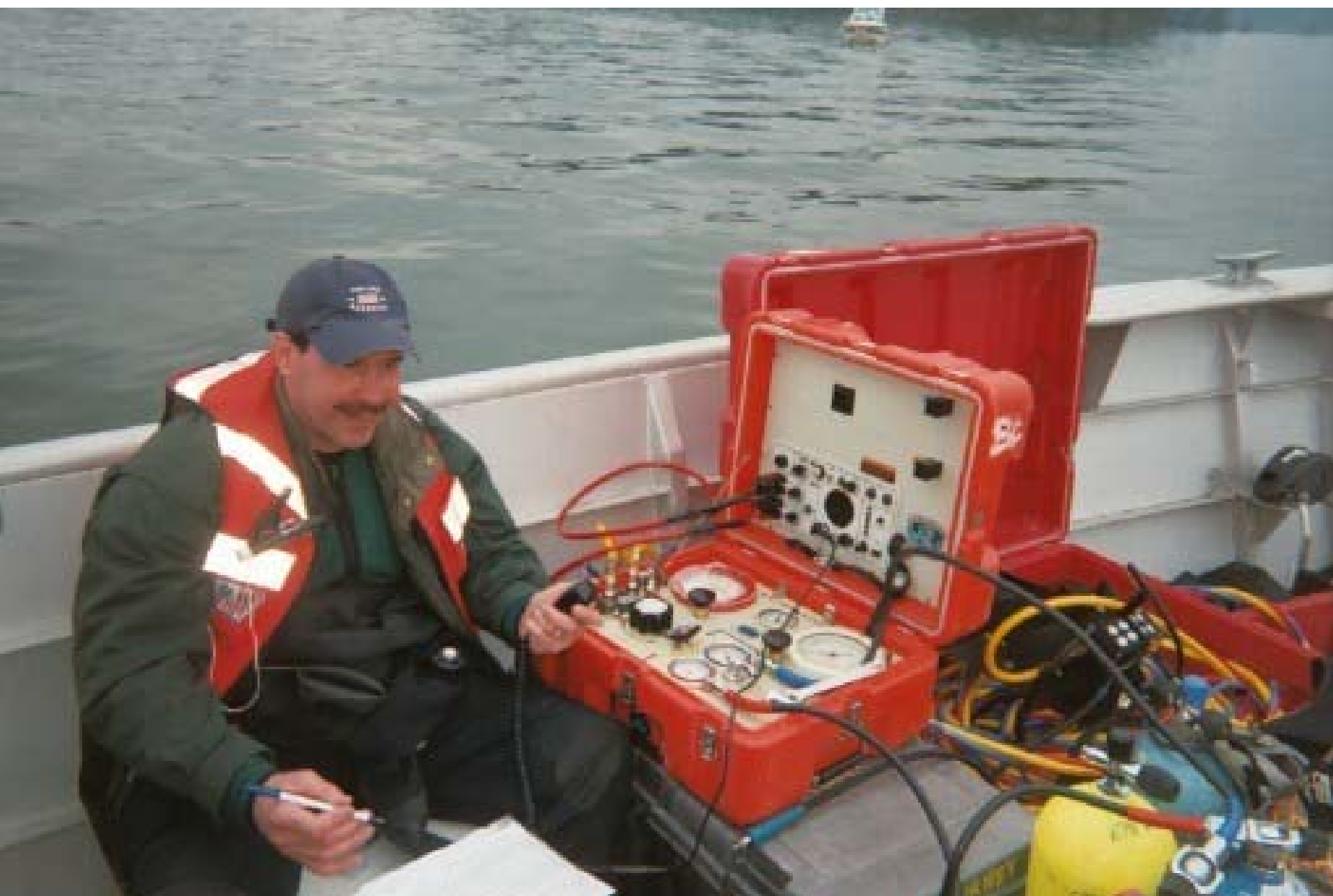
L to R Scott Grossman, ERT, and Dennis Orenshaw, R3 Dive Master. Scott is in Viking dry suit and Dennis is in Dive Rite dry suit with surface supply harness, weights and hoses.



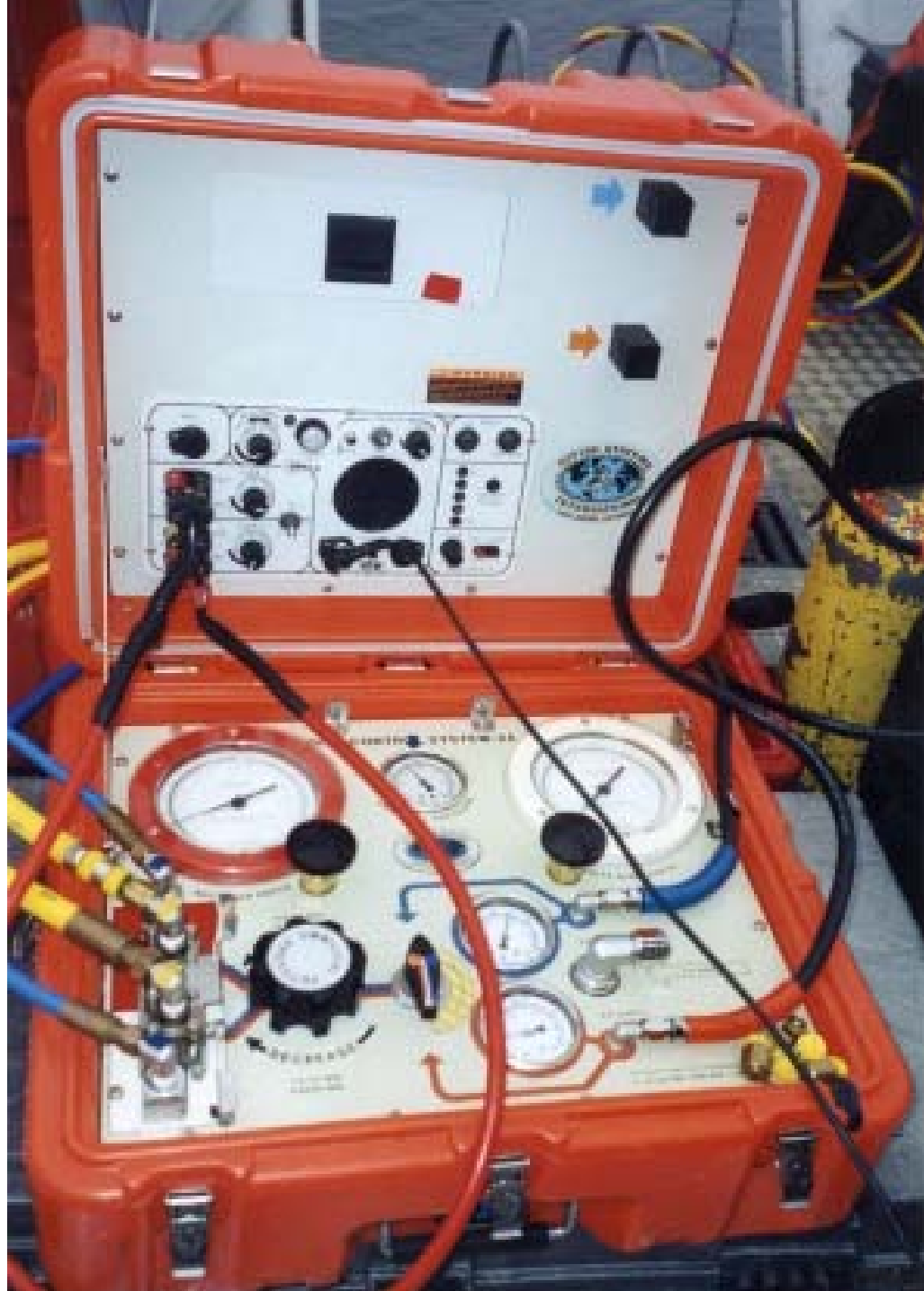
**Dennis Orenshaw, R3 Dive Master.
Showing surface supply
“bailout bottle” redundant air
supply.**



Bill Hoffman, R3 Diver, working the surface supply box and communications showing SCUBA tanks cascade system on deck.



Surface supply provided “unlimited” air supply along with hard wire communications. The wire and hoses acted as safety tether providing a physical connection with the diver below. The dive master on deck tracked bottom time and depth allowing diver to focus on search. Diver slang - “Dope on a rope”.



**Dennis Orenshaw, R3 Dive Master.
When not in the water divers acted
as tenders or if qualified as the
Dive Master for the diver below.**



Divers recovered pieces of the landing gear and other debris from the Shuttle during the search.



Dive operations commenced soon after the crash of the shuttle and continued into mid - April 2003.

